

WHAT IS CLAIMED IS:

1        1.    A        system        for        determining        propagation  
2        characteristics of a photonic structure having a transverse  
3        N-fold symmetry, comprising:

4        a numerical analyzer that employs a leading order  
5        systematic homogenization expansion having multiple scales  
6        to develop an angularly averaged indexed profile for said  
7        photonic structure; and

8        a principal corrector, associated with said numerical  
9        analyzer, that employs details of said photonic structure  
10       and said homogenization expansion to obtain effective  
11       refractive indices of modes of said photonic structure.

1        2.    The system as recited in Claim 1 wherein said  
2        modes are bound modes and said numerical analyzer  
3        incorporates decaying boundary conditions at spatial  
4        infinity.

1        3.    The system as recited in Claim 1 wherein said  
2        modes are leaky, scattering or quasi-modes and said  
3        numerical analyzer incorporates outward-going radiation  
4        boundary conditions.

1           4.    The system as recited in Claim 1 wherein said  
2    photonic structure has a simple layered potential  
3    corresponding to a simple layered refractive index profile.

1           5.    The system as recited in Claim 1 wherein said  
2    photonic structure has an arbitrary geometry.

1           6.    A       method       of       determining       propagation  
2   characteristics of a photonic structure having a transverse  
3   N-fold symmetry, comprising:

4       employing a leading order systematic homogenization  
5   expansion having multiple scales to develop an angularly  
6   averaged indexed profile for said photonic structure; and

7       employing details of said photonic structure and said  
8   homogenization expansion to obtain effective refractive  
9   indices of modes of said photonic structure.

1       7.    The method as recited in Claim 6 said modes are  
2   bound modes and said employing said leading order  
3   systematic homogenization expansion comprises incorporating  
4   decaying boundary conditions at spatial infinity.

1       8.    The method as recited in Claim 6 wherein said  
2   modes are leaky, scattering or quasi-modes and said  
3   employing said leading order systematic homogenization  
4   expansion comprises incorporating outward-going radiation  
5   boundary conditions.

1       9.    The method as recited in Claim 6 wherein said  
2   photonic structure has a simple layered potential  
3   corresponding to a simple layered refractive index profile.

1           10. The method as recited in Claim 6 wherein said  
2    photonic structure has an arbitrary geometry.

1           11. A photonic structure designed by the method of  
2    Claim 6.

1           12. A photonic structure designed by the method of  
2    Claim 7.

1           13. A photonic structure designed by the method of  
2    Claim 8.

1           14. A photonic structure designed by the method of  
2    Claim 9.

1           15. A photonic structure designed by the method of  
2    Claim 10.